

# ***Gas-Loading Capabilities at the NIST Center for Neutron Research***

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Sample Environment at Neutron Scattering Facilities  
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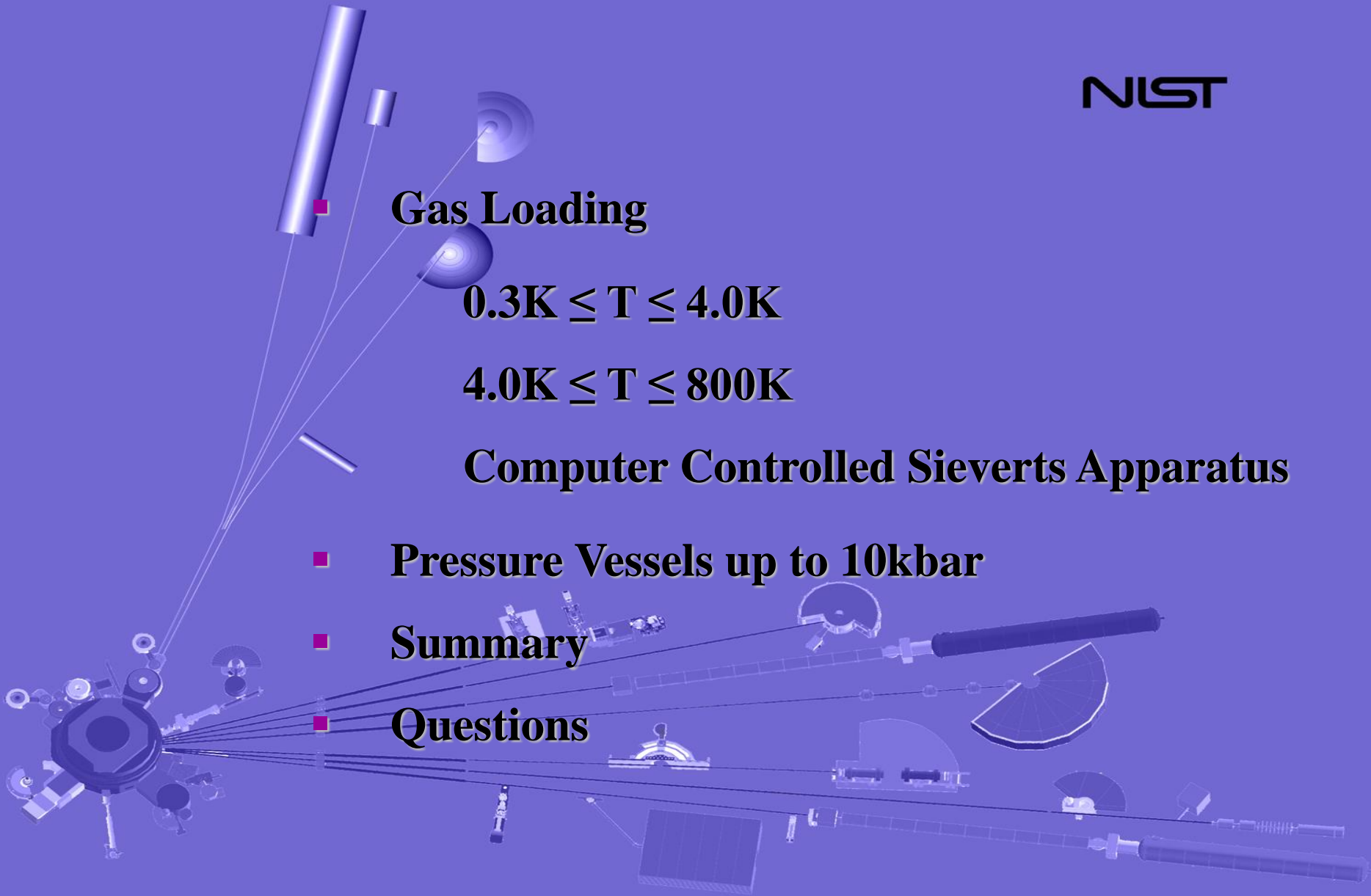
## Gas Loading

$$0.3\text{K} \leq T \leq 4.0\text{K}$$

$$4.0\text{K} \leq T \leq 800\text{K}$$

## Computer Controlled Sieverts Apparatus

- Pressure Vessels up to 10kbar
- Summary
- Questions



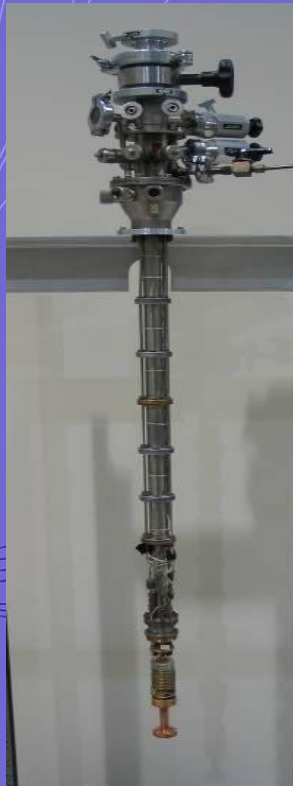
$$0.3\text{K} \leq T \leq 4.0\text{K}$$

## OC Dilution Insert:

50 mK base Temp

70 mm x Ø35 mm smpl spc

2 capillary lines



## Cu Sample Can:

0.375 in ID

0.510 in OD

500bar rating (SF2)



$3.5\text{K} \leq T \leq 800\text{K}$

**TLCCR:**

**55 mm bore allows for handling  
air sensitive and cryogenic samples as  
well as 10T magnet insert**

**Sample sticks with temperature  
controlled heated gas line provide up to  
25 watts @ 24V**

**Pressure rating (SF2):**

**Al - 120psi**

**Va - 200psi**



# Computer Controlled Sieverts Apparatus

Four different pressure gauges for accurate reading:

0 - 2 bar

0 - 7 bar

0 - 35 bar

0 - 200 bar

$P \leq 100\text{bar}$

$4.0\text{K} \leq T \leq 1500\text{K}$

$V_d \sim 10\text{ cm}^3$





# Computer Controlled Sieverts Apparatus

## Safety Features:

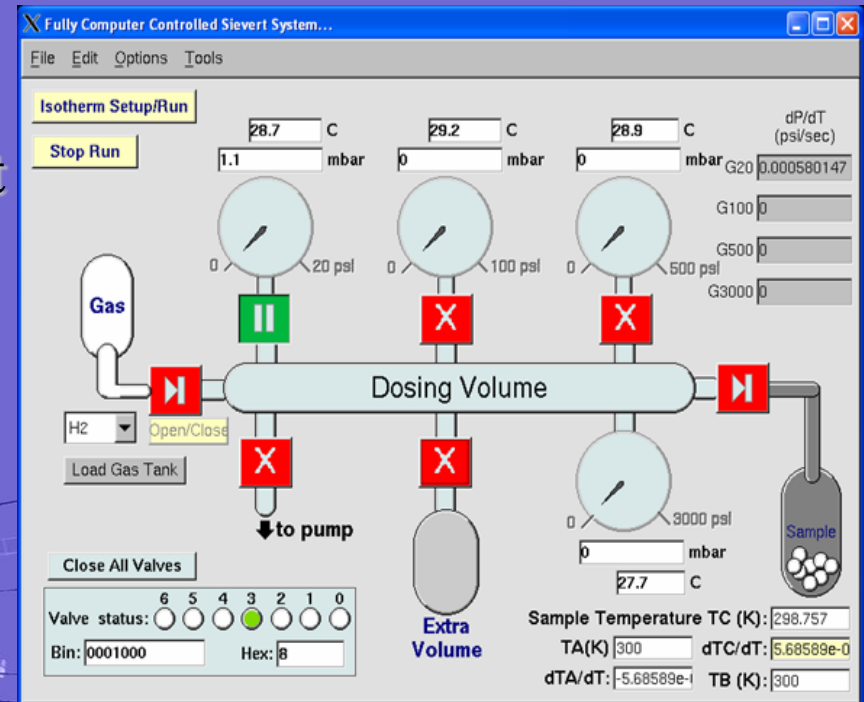
If pressure exceed max. limit

Cylinder valve closes

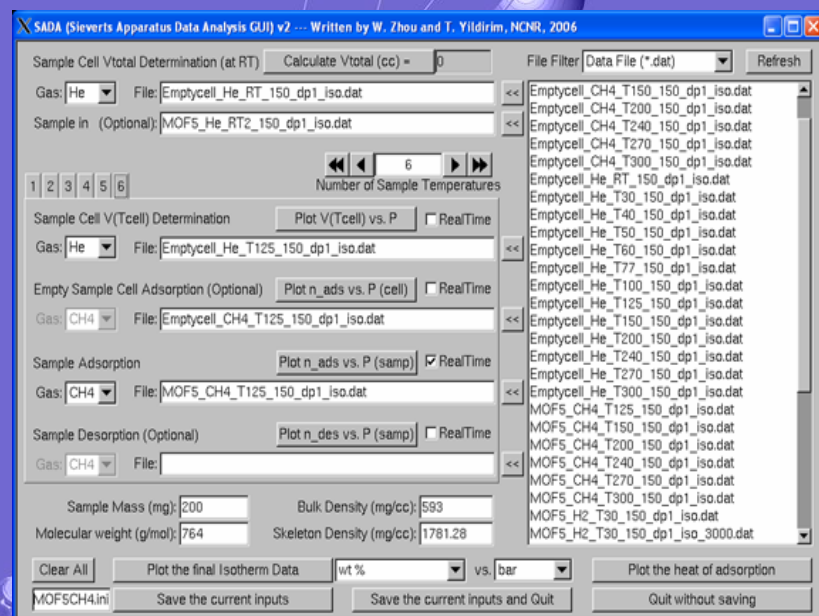
Gauge valves close

Sample valve opens

$V_d$  is pumped



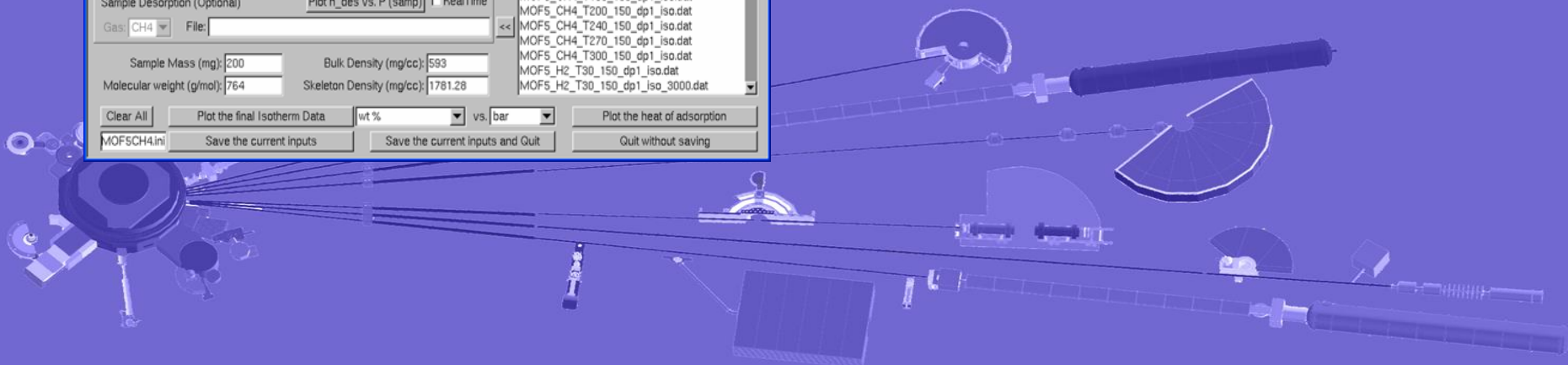
# Computer Controlled Sieverts Apparatus



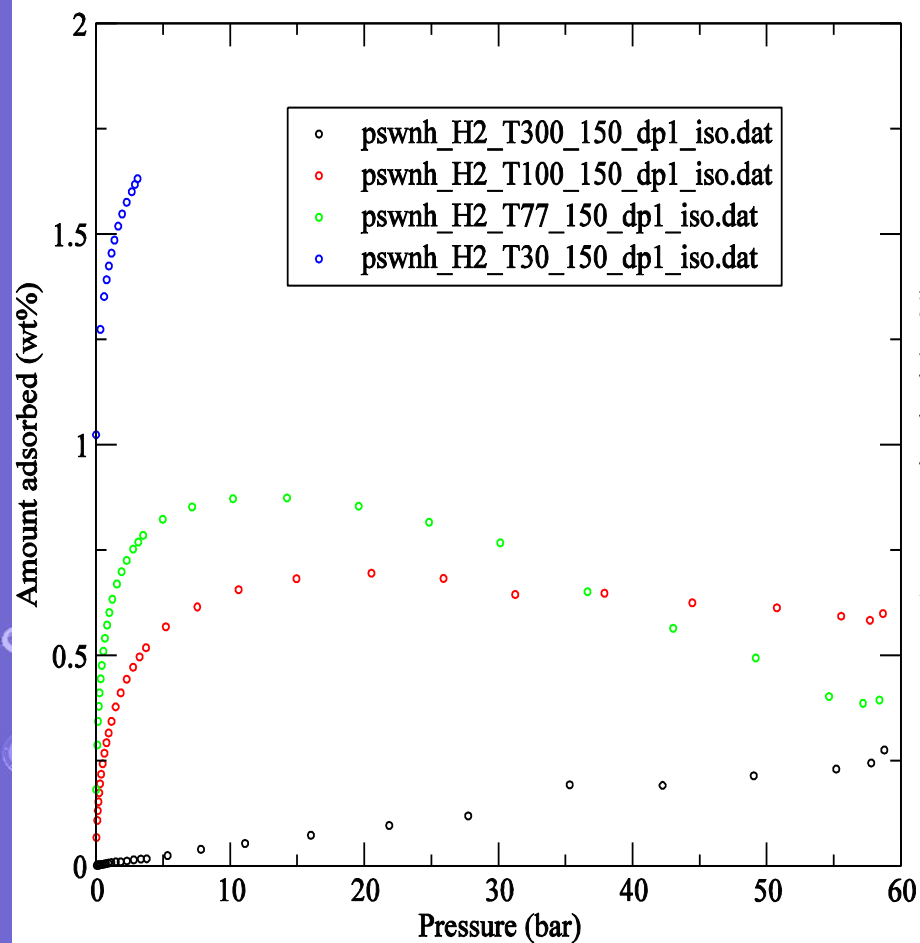
RS232 communication

Python GUI works both in  
linux and Bill

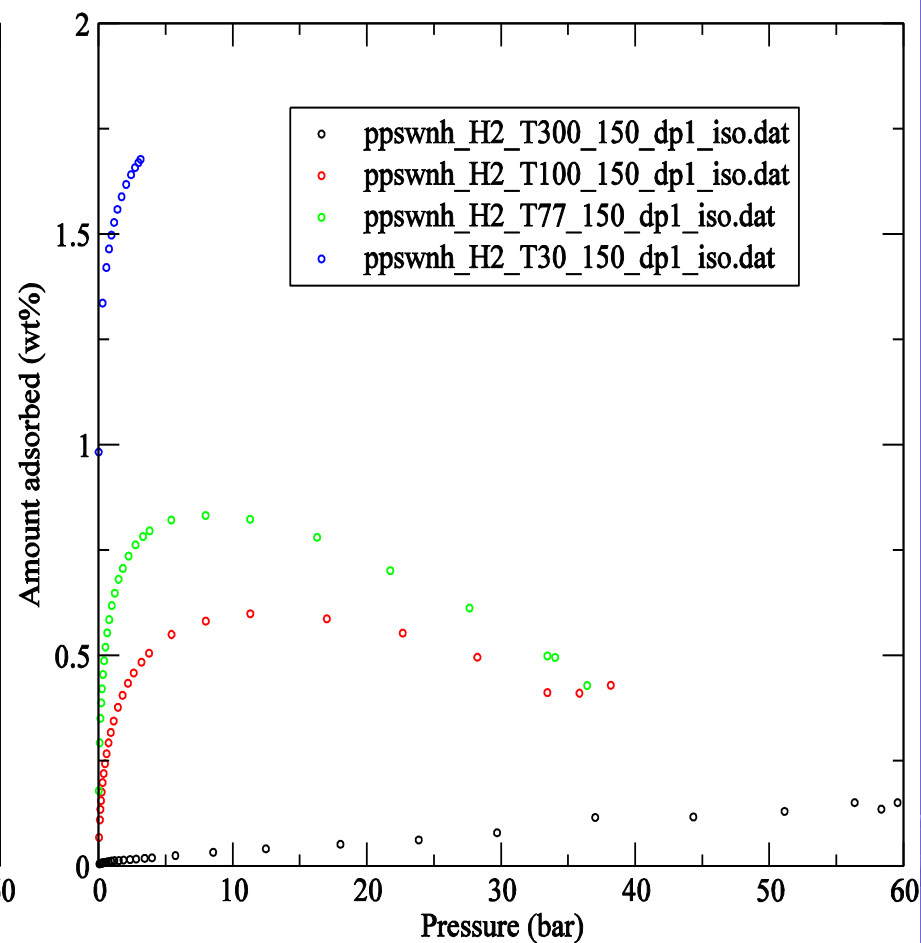
Supports scripting for remote  
experiments



### Excess Adsorption Isotherm (SWNH)



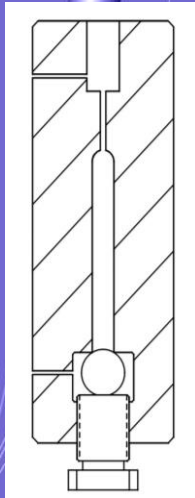
### Excess Adsorption Isotherm (Pt SWNH)





# Pressure Vessels

NIST



**Al 7075-T6 construction**

**$P \leq 6\text{kbar (SF1.5)}$**

**$W = 6:1$**

**$1.5\text{K} \leq T \leq 300\text{K}$**

**$V_s = 1.6\text{ cm}^3$**

**$T_{2\theta_{av}} = 65\% \text{ at } 2\text{\AA}$**



**13-8Mo construction**

**$P \leq 10\text{kbar (SF1.5)}$**

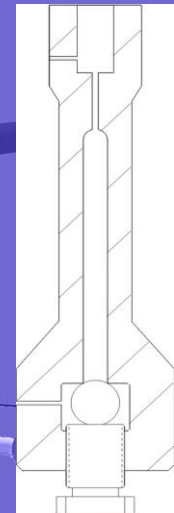
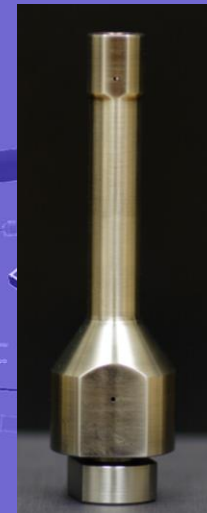
**$W = 3:1$**

**$1.5\text{K} \leq T \leq 300\text{K}$**

**$V_{S\text{ eff}} = 1.6\text{ cm}^3$**

**$V_{S\text{ Total}} = 2.8\text{ cm}^3$**

**$T_{2\theta_{av}} = 23\% \text{ at } 2\text{\AA}$**

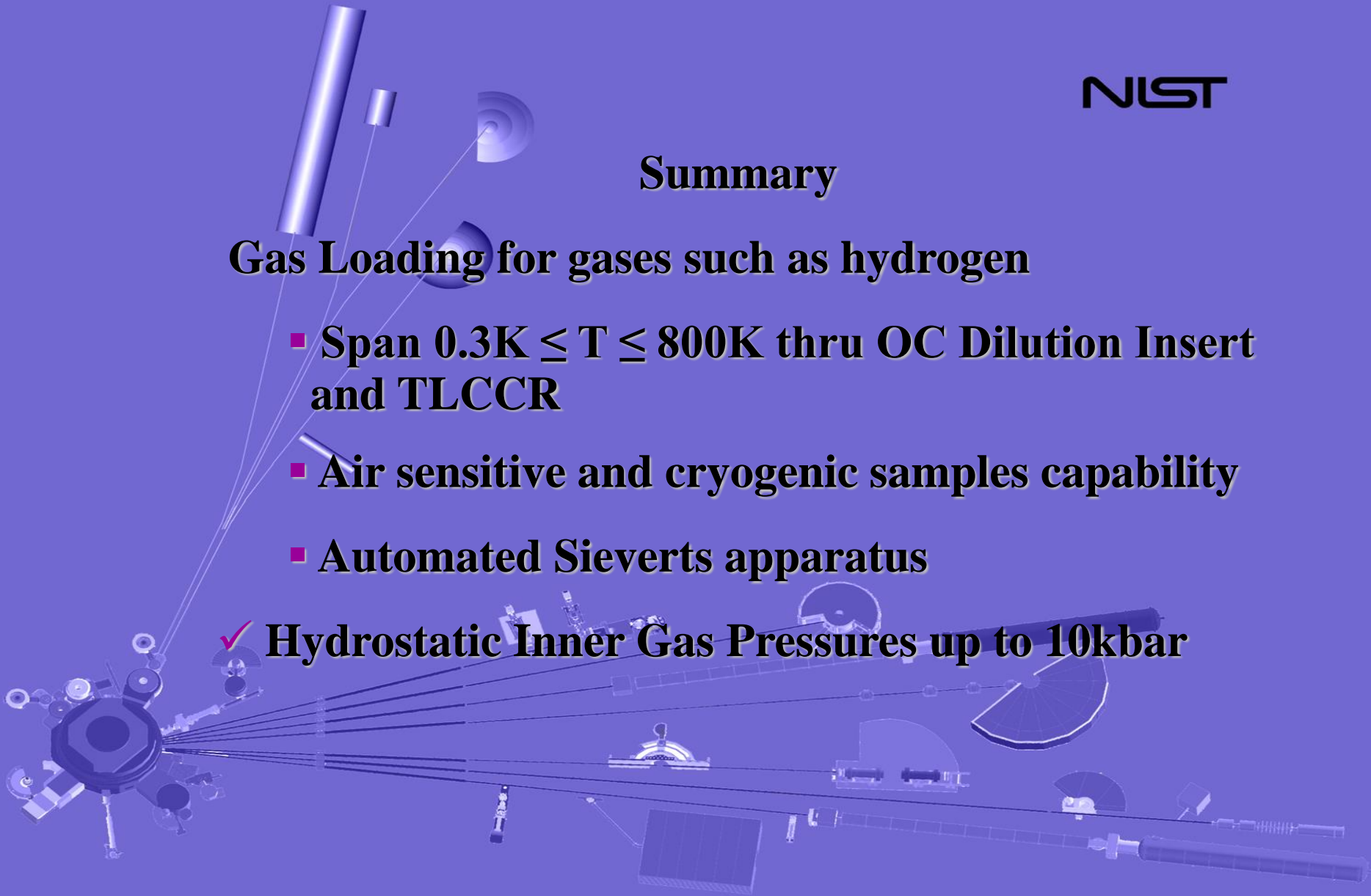


## Summary

**Gas Loading for gases such as hydrogen**

- Span  $0.3\text{K} \leq T \leq 800\text{K}$  thru OC Dilution Insert and TLCCR
- Air sensitive and cryogenic samples capability
- Automated Sieverts apparatus

✓ **Hydrostatic Inner Gas Pressures up to 10kbar**



# Questions

